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Case Report

An extremely rare case of whirl sign in combination with colonic pneumatosis intestinalis: What is your provisional diagnosis?

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Abstract

Volvulus of the intestine is a surgical emergency with the clinical triad of constipation, progressive abdominal distension, and severe abdominal pain. A typical whirl sign on computed tomography can be observed in bowel volvulus. Pneumatosis intestinalis is another rare radiographic finding characterized by the presence of intramural gas-filled cysts in the bowel wall. It also could be a life-threatening entity requiring emergency surgical intervention. Although image findings of either a whirl sign or pneumatosis intestinalis are not pathognomonic, evidence has shown that a combination of these two findings is extremely rare and strongly associated with a fulminant bowel infarction caused by intestinal volvulus. However, we report a 22-year-old man with a whirl sign as well as intramural bowel gas over the sigmoid colon on imaging but with no evidence of an intra-abdominal crisis. This case discloses that it may be a nonsignificant finding and does not uniformly mandate surgical exploration. It is important to understand that both radiographic signs must be interpreted relative to the patient's overall clinical condition, and the emergency physician should keep these factors in mind in daily practice.

Keywords: Pneumatosis intestinalis; Whirl sign

1. Introduction

It is known that the whirl sign on computed tomography (CT) is highly suggestive of bowel volvulus and may present with the typical clinical manifestations of constipation, progressive abdominal distension, and severe abdominal pain. Pneumatosis intestinalis is another rare radiographic finding characterized by the presence of intramural bowel gas in the gastrointestinal tract. It is often secondary to an underlying disease process and also could be a life-threatening issue requiring emergency surgical intervention. Although image findings of either a whirl sign or pneumatosis intestinalis are not pathognomonic, available evidence has shown that a combination of the two findings is extremely rare and strongly associated with a fulminant bowel infarction caused by intestinal volvulus.[1–3]

We report a 22-year-old man with the symptoms and plain abdomen suspicion of ileus. Contrast-enhanced CT showed a whirl sign in combination with intramural bowel gas in the sigmoid colon, but no physical signs of an intra-abdominal crisis.

2. Case report

A previously healthy 22-year-old man visited our emergency department after 2 days of constipation, nausea, progressive abdominal fullness, and diffuse abdominal pain. He had a history of megacolon status after subtotal colectomy (including the ascending, transverse, and descending colon with preservation of the sigmoid colon) and ileocolonic anastomosis when he was an infant. On admission, his vital

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signs were stable and physical examination revealed soft but diffuse abdominal distension with hypoactive bowel sounds. Laboratory results showed leukocytosis (white blood cell count: 16,170/μL) with a left shift (neutrophils, 78%). Plain abdominal radiography demonstrated gross dilation of the small bowel with numerous air−fluid levels and contrast-enhanced CT revealed a whirl sign (Fig. 1) with concomitant intramural bowel gas in the sigmoid colon (Fig. 2). Intestinal infarction complicated by bowel volvulus was highly suspected. A similar interpretation was reached by the assigned radiologist shortly afterwards. There were no physical signs of intra-abdominal abnormalities or pending crises, therefore, the patient was initially treated conservatively with fasting, intravenous fluid supplementation, and prokinetic agents under close monitoring. He eventually recovered completely without any complications.

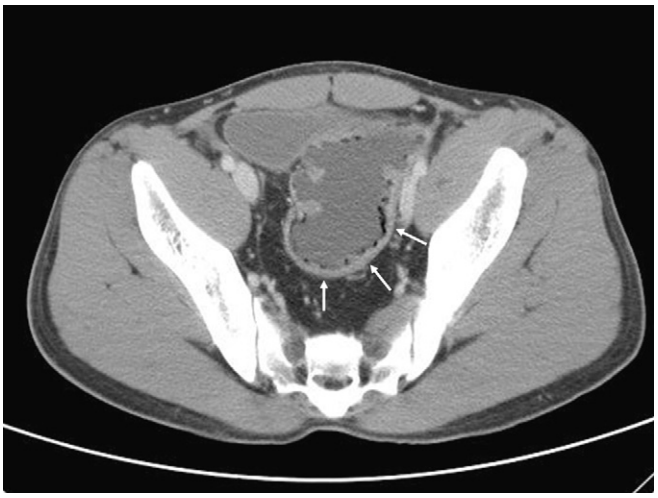

Fig. 2. Contrast-enhanced computed tomography discloses intramural bowel gas (pneumatosis intestinalis) in the sigmoid colon (white arrows).

3. Discussion

Fisher first described the whirl sign on CT scanning in various patients with bowel volvulus .[4] This rare sign occurs because of rotation of the afferent and efferent bowel loops around the axis of the obstruction, thus tightly twisting the gut surrounding the mesenteric vessels. The finding is highly suggestive of gut volvulus, which is highly dangerous if not treated promptly. More than 50% of patients die when intestinal gangrene develops.[5] Flexible colon fibroscopic decompression followed by elective definitive surgery for the redundant segment is the treatment of choice when the bowel is viable, but exploratory laparotomy is mandatory if any complicated entity occurs.

Pneumatosis intestinalis is also a rare radiographic finding characterized by intramural gas-filled cysts in the gastrointestinal tract. Etiology may be benign or lethal conditions that call for emergency surgery.[6,7] Mucosal integrity, intraluminal pressure, bacterial flora, and bowel gas all account for the formation of intramural gas. The most common and serious

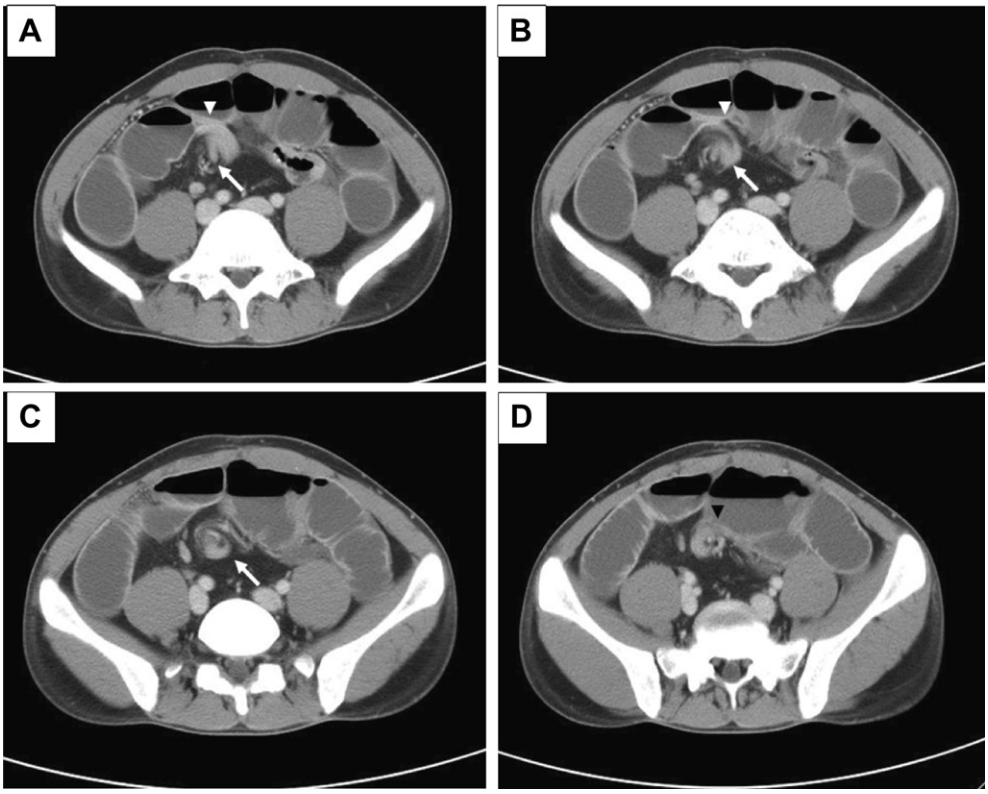

Fig. 1. Contrast-enhanced computed tomography discloses a dilated small bowel with air−fluid levels in combination with a whirl sign (A−C, white arrows) composed of mesentery and its attachments, and the transitional zones (A, ileum side, white arrowhead) and sigmoid colon side (D, black arrowhead).

cause of intramural bowel gas is bowel necrosis. This is caused by ischemia, necrotizing enterocolitis, volvulus, or sepsis. The optimal management in patients with this entity depends on the severity of the underlying disease. Surgical intervention is indicated when acute complications occur.

Duda et al have reported that a patient with the whirl sign is 25.3 times more likely to require bowel obstruction surgery than a patient without the sign.[2] CT is the optimal imaging technique to depict this sign and associated complications (wall thickening, pneumatosis intestinalis, and mesenteric fat stranding). Gollub et al have revealed that most cases of intestinal volvulus can be identified on CT by detection of a whirl sign. It is important to note that the whirl sign can occur in any situation as long as there is rotation or twisting of the gut and its mesenteric attachments.[8]

Although imaging findings of either a whirl sign or pneumatosis intestinalis are not pathognomonic, evidence has shown that a combination of the two findings is strongly associated with a fulminant bowel infarction caused by intestinal volvulus. The whirl sign in our patient initially made us suspicious of volvulus of the unfixed bowel. The distended sigmoid colon with intramural bowel gas make us though of bowel infarction. However, the patient recovered uneventfully under noninvasive treatment. Instead of serious changes in the bowel, we propose that there may have been some inflammation in the bowel accompanied by ileus, causing gas to enter the slightly dissected colon, thus resulting in intramural gas. The whirl sign may have been the consequence of a distorted intestinal structure and its mesenteric attachment after subtotal colectomy or spontaneous detorsion of the rotated bowel. This case report draws attention to a clinical condition discrepant from the radiologic imaging that suggested lethal bowel infarction complicated by intestinal volvulus. Although it may be a nonsignificant finding that does not uniformly mandate surgical exploration, it is still important to assess the need to do so in an emergency setting.

References

1. Peterson CM, Anderson JS, Hara AK, Carenza JW, Menias CO. Volvulus of the gastrointestinal tract: appearances at multimodality imaging. *RadioGraphics*. 2009;29:1281−1293.
2. Duda JB, Bhatt S, Dogra VS. Utility of CT whirl sign in guiding management of small-bowel obstruction. *Am J Roentgenol*. 2008;191:743−747.
3. Suárez Vega VM, Martí de Gracia M, Verón Sánchez A, Alonso Gamarra E, Garzón Moll G. Trapped on the "whirl": diagnostic sign on emergency CT. *Emerg Radiol*. 2010;17:139−147.
4. Fisher JK. Computed tomographic diagnosis of volvulus in intestinal malrotation. *Radiology*. 1981;140:145−146.
5. Lal SK, Morgenstern R, Vinjirayer EP, Matin A. Sigmoid volvulus an update. *Gastrointest Endosc Clin N Am*. 2006;16:175−187.
6. Ho LM, Paulson EK, Thompson WM. Pneumatosis intestinalis in the adult: benign to life-threatening causes. *Am J Roentgenol*. 2007;188:1604−1613.
7. St Peter SD, Abbas MA, Kelly KA. The spectrum of pneumatosis intestinalis. *Arch Surg*. 2003;138:68−75.
8. Gollub MJ, Yoon S, Smith LM, Moskowitz CS. Does the CT whirl sign really predict small bowel volvulus?: experience in an oncologic population. *J Comput Assist Tomogr*. 2006;30:25−32.